

1/2 014 UNCLASSIFIED PROCESSING DATE--0900170  
TITLE--THEORY OF HOMOGENEOUS REACTIONS INVOLVING PROTON TRANSFER -U-  
AUTHOR--(05)--LEVICH, V.G., DOBONADZE, R.R., GERMAN, E.O., KUZNETSOV, A.M.,  
KHARKATS, YU.I.  
COUNTRY OF INFO--USSR  
SOURCE--ELECTROCHIM. ACTA 1970, 15(2), 353-67  
DATE PUBLISHED-----70  
SUBJECT AREAS--CHEMISTRY  
TOPIC TAGS--PROTON, QUANTUM MECHANICS, CHEMICAL REACTION  
CONTROL MARKING--NO RESTRICTIONS  
DOCUMENT CLASS--UNCLASSIFIED  
PROXY REEL/FRAME--1992/1849 STEP NO--UK/0000/70/015/002/0353/0367  
CIRC ACCESSION NO--AP0112833  
UNCLASSIFIED

2/2 014

UNCLASSIFIED

PROCESSING DATE--09OCT70

CIRC ACCESSION NO--AP0112833

ABSTRACT/EXTRACT--(U) GP-0-

ABSTRACT. A QUANTUM MECH. THEORY FOR PROTON  
TRANSFER PROCESSES IN SOLNS. IS GIVEN. THE BRONSTED RULE AND ISOTOPE  
EFFECT FOR THESE PROCESSES ARE ALSO DISCUSSED.

FACILITY: INST.  
ELECTROCHEM., MOSCOW, USSR.

UNCLASSIFIED

89

USSR

UDC 576.851.49(B.typhi).097.3:54

GERMAN, G. P., and CHERNOKHVESTOVA, Ye. V., Moscow Institute of Epidemiology and Microbiology

"Immunochemical Heterogeneity of Incomplete Antibodies to O-Antigen of S. Typhi"

Moscow, Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, No 11, 1971, pp 127-131

Abstract: Blood serum of typhoid patients, individuals vaccinated against this disease, and chronic typhoid carriers may contain three types of incomplete antibodies to the O-antigen of S. typhi -- IgG, IgA, and IgM -- which differ from each other in immunochemical properties and which also differ from the corresponding complete antibodies in chemical and physical properties. The IgG type of O-antibodies occurs most frequently and in the highest titers. The IgG type antibodies are also present in the serum of vaccinated persons in whom the synthesis of complete O-antibodies is inhibited. In chronic S. typhi carriers, production of complete O-antibodies of the IgM type is suppressed, while incomplete antibodies of the IgM type are present in their blood serum, though in low titers. In mice infected with typhoid O-antigen, incomplete IgG and IgM type O-antibodies are synthesized in the early stage of the

1/2

USSR

GERMAN, G. P., and CHERNOKHVESTOVA, Ye. V., Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii, No 11, 1971, pp 127-131

immune response and are present in the serum prior to the appearance of complete antibodies.

2/2

Organometallic Compounds

USSR

UDC 542.91:547.1'119:547.412.732

KOPAYEVICH, Yu. L., VELEN'KIY, G. G., MYSOV, Ye. I., GERMAN, L. S., and KNUNYANTS, I. L., Institute of Element-Organic Compounds, Academy of Sciences USSR

"Derivatives of Bis(pentafluoroethyl)arsenous Acid"

Moscow, Izvestiya Akademii Nauk SSSR, Seriya Khimicheskaya, 1, Jan 73, pp 121-122

Abstract: The reaction of ethanol with  $(C_2F_5)AsF$  (I) results in the formation of small amounts of the corresponding ester. In the presence of  $SiO_2$ , however, the yield of  $(C_2F_5)_2AsOC_2H_5$  is significantly increased. The hydrolysis of I leads to the formation of  $(C_2F_5)AsOAs(C_2H_5)_2$ ; and the subsequent reaction with diethylamine to  $(C_2F_5)_2AsN(C_2H_5)_2$ . Reaction of (I) with phenylmagnesium bromide leads to the formation of  $(C_2H_5)_7AsC_6H_5$ . Syntheses, elemental composition, and mass spectrometric and NMR data are given for the compounds generated.

1/1

USSR

UDC 539.193:547.242

KOPAYEVICH, YU. L., STUMBREVICHUTE, Z. A., FEDOROV, L. A., and GERMAN, L. S.

"NMR Spectra and Structure of Polyfluoroalkylarsines"

Leningrad, Zhurnal Obshchey Khimii, Vol 43 (105), No 5, May 73, pp 1140-1147

Abstract: Derivatives of bis(pentafluoroethyl)arsinous acid, of mixed tertiary arsines, derivatives of bis( $\alpha$ -chlorotetrafluoroethyl)arsinous acid, and tertiary arsines were studied by NMR  $^{19}\text{F}$  spectroscopy. Spectral characteristics originating from the presence of chiral and prochiral centers in the compounds studied have been observed and discussed. The As-Hlg bonds were shown to be very labile. Inversion of the arsenic atom was shown to be slow (in the NMR time scale).

1/1

## Organometallic Compounds

USSR

UDC 542.91:547.242+546.16

KOPAYEVICH, YU. L., EELEN'KIY, G. G., GERMAN, L. S., and KNUNYANTS, I. L.,  
Institute of Organoelemental Compounds, Academy of Sciences USSR

## "Fluoroalkylarsenic Derivatives"

Moscow, Izvestiya Akademii Nauk SSSR, Seriya Khimicheskaya, No 5, 1971,  
pp 1124-1125

Abstract: Tertiary polyfluoroalkylarsines were synthesized by addition of  $\text{AsF}_3$  (I) to certain fluoro-derivatives of ethylene in the presence of  $\text{SbF}_5$  (II). Thus, the reaction of (I) with  $\text{CH}_2=\text{CF}_2$  at  $100-120^\circ$  under pressure for 6 hours, in the presence of traces of (II) yielded the following:  $(\text{CH}_3\text{CH}_2)_3\text{As}$ , 42% yield, b.p.  $146-147^\circ$ . The reaction of (I) with  $\text{CF}_2=\text{CFH}$  requires 0.3 moles of (II) and is easily executed under pressure at  $20^\circ$ . This produced  $(\text{CF}_3\text{CFH})_3\text{As}$  in 74% yield and b.p.  $114-115^\circ$ . By the reaction of (I) with  $\text{CF}_2=\text{CF}_2$  in the presence of 0.3 moles (II) under pressure at  $20^\circ$ , the following products were obtained: 1)  $(\text{C}_2\text{F}_5)_3\text{As}$ , b.p.  $87-88^\circ$ , yield 39%; 2)  $(\text{CF}_3\text{CF}_2)_2\text{AsF}$ , yield 30%, b.p.  $67-68^\circ$ . The structure of these compounds were confirmed by nuclear magnetic resonance and mass-spectroscopic data.

1/1

SSSR

UDC 612.014.424.2

G  
MERMER, M. Z., Latvian Scientific Research Institute of Experimental and  
Clinical Medicine, Ministry of Health, Latvian SSR

"Possible Mechanism of the Biological Action of an Electrostatic Field"

Riga, Izvestiya Akademii Nauk Latvyskoy SSR, No 4 (285), 1971, pp 69-72

Abstract: Due to the natural electrostatic field of the earth and the presence of ions in the air, a direct current of 130-500 V/m and of a few millionths of an ampere is continuously flowing through the air. Technological structures (housing, machinery, and so on) can considerably increase the electrostatic field, while an increasing concentration of ions in the air increases the current. A live organism, including the human body, offers very little electrical resistance, and therefore the current flows through it. Any pointed protruberance on the body surface, such as hairs, cilia, thorns, or needles, facilitates charge leakage and thus increases the current flow through the body. If, however, the body is not grounded, no current can flow through it. Since evidence suggests that the electrostatic field of the earth exerts certain effects even on an insulated live body, other mechanisms of action remain to be elucidated.

1/1

- 70 -



USSR

UDC: 621.791.011:669.15-194

FOMINA, O. P., LEVENBERG, N. Ye., SELEZNEV, A. G., and GERMAN, S. I.;  
Khar'kov Polytechnical Institute, Khar'kov, Turbine Plant

"Mechanical Properties of the Metal in the High-Temperature Region of the  
Heat-Affected Zone in 15Kh1M1FL Steel Welds"

Kiev, Avtomaticheskaya Svarka, No 11, Nov 70, pp 30-31

Abstract: A study was made of the high-temperature region of the  
heat-affected zone in 15Kh1M1FL steel (0.19% C, 0.64% Mn,  
1.7% Cr, 1.14% Mo, 0.14% V). The effects of various tempering conditions  
on the structural transformations and properties of the metal of each  
variant of the imitated weld-affected zone were analyzed. It was found  
that the ductility of the metal in the high-temperature region of the  
heat-affected zone markedly depends on the cooling rate after welding.  
As applied to multipass welding conditions, the required impact toughness  
may be met by tempering the weld at 740-760°C. The hardness of the high-  
temperature region of the heat-affected zone in 15Kh1M1FL will not always

1/2

USSR

FOMINA, O. P., et al, Avtomaticheskaya Svarka, No 11, Nov 70, pp 30-31

correlate with the impact toughness. A decrease in the hardness after tempering even to HV 220 for a metal very slowly cooled down from 1300°C will not raise the impact toughness.

2/2

USSR

GERMAN, V. A.

"One Algorithm for Cutting of Graphs"

Ob Odnom Algoritme Rasrezaniya Grafov [English Version Above], Riga, 1972, 9 pages (Translated from Referativnyy Zhurnal Kibernetika, No 4, 1973, Abstract No 4V418 Dep, by the author).

Translation: Suppose we are given a graph  $G(X, U)$ , where each point  $x_i \in X$  has weight  $v_i > 0$ , while each line  $u_{ij} \in U$  has cost  $c_{ij} \geq 0$ . The total weight of all points of the graph is  $V_0$ . Cutting of the graph refers to division of  $G$  into two subgraphs  $G^+(X^+, U^+)$  and  $G^-(X^-, U^-)$ , where  $x_0 \in X^+$ , and  $x_0$  is a certain fixed point, while  $G^+$  is always a connected subgraph. The cost of cutting is defined by the cost of the branches "cut":  $C = \sum c_{ij}$ ,  $x_i \in X^+$ ,  $x_j \in X^-$ . The task is set of selecting a cutting of a graph to minimize  $C$  under the condition  $\sum v_i \leq V$ ,  $x_i \in X^+$ ,  $V < V_0$ . The discrete problem formulated is replaced by a simplified continuous problem, where the connection of points (or groups of points) to  $X^+$  occurs "continuously," while the cost of cutting also varies

1/2

USSR

German, V. A., Ob. Odnom Algoritme Rasrezaniya Grafov, Riga, 1972, 9 pages.

"continuously." The optimal sequence of attachment (OSA) of points (groups of points) is that which minimizes the "continuous" cost of cutting  $C(V)$  for any  $V(0 < V < V_0)$ . A theorem is formulated and proven on the existence of OSA for an arbitrary connected graph. An algorithm is presented for determination of the OSA. Construction of the OSA does not always guarantee that the optimal solution will be found, but, due to the properties of the OSA, a maximum estimate can be given for the optimal solution. Thus, in contrast to other known heuristic methods, it is easy to check the accuracy and determine the optimal solution.

2/2

- 45 -

USSR

UDC: 8.74

GERMAN, V. A.

"On Calculating the Time of Execution of Computer Programs"

V sb. Tsifr. vychisl. tekhnika i programmir. (Digital Computer Technology and Programming--collection of works), vyp. 7, Moscow, "Sov. radio", 1972, pp 37-50 (from RZh-Kibernetika, No 8, Aug 72, Abstract No 8V649)

Translation: Methods are outlined for calculating the time of execution of machine programs on digital computers. The rate of execution of each block of the program is studied. The analyzed programs are stochastic graph-models. The proposed algorithms may be used for calculating models of high dimensionality since they make extensive use of the structural properties of the investigated graph-models. The apparatus of Boolean matrices is used to establish the different structural properties of the graph-models. Author's abstract.

1/1

USSR

UDC: 519.2

GERMAN, V. A., Editor, "Avtomatika i vychislitel'naya tekhnika"

"Use of Structural Methods for Computing Markov Chain Parameters"

Riga, 1971, 15 pages, illustrated, bibliography of 10 titles  
(from RZh--Matematika, No 6, 1972, Abstract No 6V41 Dep)

Translation: The known adequacy between a system of algebraic equations and an oriented graph permits the solution of a system with the help of some transformations in the graph. In this case, the graph allows taking into account the structural connections between the variables, often resulting in a large reduction in the amount of calculations. The present paper uses one of the well-known transformations of the graph: breaks in the curves. The elimination of the graph's branches, which leads to breaks in the curves, corresponds to the reduction of a matrix of coefficients to the equivalent triangular form.

All the operations for elimination of some of the branches from the graph are formulated with the use of Boolean matrices, which makes the algorithm useful for computing large graphs on an electronic calculator. A Markov chain with absorption is considered as an application of a graph transformation algorithm. It is shown that all

1/2

USSR

GERMAN, V. A., RZh--Matematika, No 6, 1972, Abstract No 6V41 Dep)

fundamental problems for computing the parameters of Markov chains may be solved in two steps: in the first, the structural step, the original graph is transformed into an acyclic one; in the second, the parameters are computed. In accordance with this system, the author calculates the average frequencies of occurrence of each state before absorption, and their dispersions, and investigates the sensitivity of the Markov chain parameters.

This algorithm is especially effective when a small number of branches must be eliminated for the graph to be transformed into its acyclic form.

2/2

- 37 -

USSR

UDC: 519.2

GERMAN, V. A., Editorial Staff of "Avtomatika i Vychislitel'naya Tekhnika",  
Academy of Sciences of the Latvian SSR

"Using Structural Methods to Calculate the Parameters of Markov Chains"

Primeneniye strukturnykh metodov dlya rascheta parametrov markovskikh  
tsepey (cf. English above), Riga, 1971, 15 pp, ill., bibl. 10 titles, No  
3905-71 Dep. (from RZh-Kibernetika, No 6, Jun 72, Abstract No 6V41 Dep)

Translation: The known correspondence between a system of algebraic equations and an oriented graph enables solution of the system by means of certain transformations done on graphs. In a given case, the graph enables accounting for the structural relations between variables, which often results in an appreciable reduction of the volume of computations. In this paper, the author makes use of a well known graph transformation: opening of loops. The removal of branches of a graph leading to opening of loops corresponds to reducing the matrix of coefficients to the equivalent triangular form.

All operations involved in removing certain branches from the graph are formulated in terms of Boolean matrices, which makes the algorithm suitable for computer calculations of large graphs. A Markov chain with

1/2



- USSR

GERMAN, V. A., Primeneniye strukturnykh metodov dlya rascheta parametrov markovskikh tsepey, Riga, 1971

absorption is considered to illustrate application of the described algorithm. It is shown that fundamental problems concerned with the calculation of Markov chain parameters can be solved in two steps: in the first (structural) stage the initial graph is converted to an acyclic graph, and in the second step the calculation of parameters proper takes place. According to this scheme the author computes the average frequencies of arrival in each state up to absorption and their variances, and investigates the sensitivity of Markov chain parameters.

The described algorithm is especially effective where it is necessary to eliminate a small number of branches to convert the graph to acyclic form.

2/2

- 1 -

Transformation and Structure

USSR

UDC 539.89

KUTSAR, A. R., GERMAN, V. N., and NOSOVA, G. I., Institute of Physical Metallurgy and Metal Physics, Central Scientific Research Institute of Ferrous Metallurgy imeni A. P. Sardin

"Alpha-Omega-Transformation in Titanium and Zirconium from Shock Waves"

Moscow, Doklady Akademii Nauk SSSR, Vol 213, No 1, Nov-Dec 73, pp 81-83

Abstract: Experiments were conducted to check out the possibility that an alpha-omega-transformation takes place in titanium and zirconium and the omega-phase is preserved after impact of a plane shock wave. Tests were made using titanium and zirconium iodide which were subjected to shock waves of varying amplitude by placing the samples in an ampule which was detonated with an explosive charge from a firing pin in the ampule. Pressure magnitude was determined by experimental measurement of the mass velocity  $u$  of the ampule surface, directly adjoining the sample, using known  $D-u$  relationships for the ampule material (steel Kh18N10T). A small amount of omega-phase was noted in titanium after exposure to a 350-kbar pressure shock wave at  $293^{\circ}$  K. At this pressure the residual temperature exceeds the omega-alpha-transformation temperature. To decrease the residual temperature of the ampule with the sample, the ampule was cooled with liquid nitrogen to  $120^{\circ}$  K where, after a test, the

1/2

USSR

KUTSAR, A. R., et al., Doklady Akademii Nauk SSSR, Vol 213, No 1, Nov/Dec 73, pp 81-83

sample contained 60-70% omega-phase when subjected to the same shock-wave pressure of 350 kbar. The same effect was noted when zirconium was tested by the same method with approximately 80% omega-phase being produced. The conclusion was made that the omega-phase is formed at 200-300° K from a shock-wave front of approximately 5-microsecond duration in titanium and zirconium and the transformation has an athermal martensite nature. Two figures, 19 bibliographic references.

2/2

- 46 -

1/2 055 UNCLASSIFIED PROCESSING DATE--18SEP70  
TITLE--PHASE TRANSFORMATIONS OF TITANIUM AND ZIRCONIUM IN SHOCK WAVES -U-

AUTHOR--(04)-GERMAN, V.N., BAKANOVA, A.A., TARASOVA, L.A., SUTULOV, YU.N.

COUNTRY OF INFO--USSR

SOURCE--FIZ. TVERD. TELA 1970, 12(2) 637-89

DATE PUBLISHED-----70

SUBJECT AREAS--MATERIALS, PHYSICS

TOPIC TAGS--ALLOY PHASE TRANSFORMATION, TITANIUM, ZIRCONIUM, SHOCK WAVE, X  
RAY DIFFRACTION, HIGH PRESSURE EFFECT

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED

PROXY REEL/FRAME--1984/0137

STEP NO--UR/0181/70/012/002/0637/0639

CIRC ACCESSION NO--AP0054933

UNCLASSIFIED

2/2 055

UNCLASSIFIED

PROCESSING DATE--18SEP70

CIRC ACCESSION NO--AP0054933

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. TI AND ZR SPECIMENS WERE INVESTIGATED AFTER A BRIEF IMPULSE LOADING WITH THE AID OF SHOCK WAVES OF AMPLITUDE 120, 200, 350, AND 500 KILOBARS. AFTER SHOCK TREATMENT, THE SPECIMENS WERE ANALYZED BY X RAY DIFFRACTION. IN ALL ZR SPECIMENS AT ALL AMPLITUDES OF SHOCK PRESSURE, LINES OF A NEW PHASE WERE OBSD. THE MAX. AMT. OF THE NEW PHASE, EXCEEDING THE AMT. OF INITIAL PHASE, WAS OBTAINED AT A PRESSURE OF 350 KILOBARS. THE NEW PHASE IS BCC. WITH ALPHA EQUALS 3.568 ANGSTROM AND D. EQUALS 6.656. FOR TI, THE NEW PHASE WAS OBTAINED AT A PRESSURE OF 350 KILOBARS. IT IS CUBIC WITH ALPHA EQUALS 3.27 ANGSTROM.

UNCLASSIFIED

USSR

UDC 621.382.002

GERMAN, YU. I., YEVSEYEV, YU. A., KABAKOV, V.L., RABINERSON, A.A., CHESNOKOV, YU.A.

"Evaluation Of The Effectiveness Of Clamped Contact Connections For Semiconductor Power Devices During Operation In A Regime Of Pulse Overload By Forward Current"

Preobrazovatel'n. tekhnika. Inform. nauchno-tekhn. sb. (Converter Technology. Information Scientific-Technical Collection), 1970, No 3, pp 4-8 (from RZh--Elektronika i yeye primeneniye, No 11, November 1970, Abstract No 11B395)

Translation: In addition to the reduction of superheating, replacement of soldered contacts by clamped contacts relieves the silicon wafer from the thermoelectromotive forces, which makes it possible to increase its overload capacity. The effectiveness of Si-Cu and W-Cu clamped contacts of dissimilar fulfillment were evaluated in a regime of pulse overload by a comparison of the experimental and theoretical values of the temperature of superheating of a p-n junction in the process of cooling the structure after the action of an individual semisinusoidal pulse of forward current. The overload capacity of devices with clamped contacts for TT-2 thyristors was increased 1.4 times on the average in comparison with devices having soldered contacts and thermocompensators. 5 ref. G.I.

1/1

USSR.

UDC 629.78.002.3

BELITSKIY, M. Ye., BATURIN, G. T., GAYDARENKO, A. L., GERMANCHUK, F. K.,  
SKRIPKA, V. F.

"Study of the Chemical Stability of Certain Nonmetallic Components of Friction Materials at High Temperatures"

Sb. nauch. tr. Kiyev. in-t inzh. grazhd. aviatsii (Collection of Scientific Works of the Kiev Institute of Civil Aviation Engineers), 1971, No. 2, pp 64-67 (from RZh-41. Raketostroyeniye, No 11, Nov 72, Abstract No 11.41.189)

Translation: Studies of the chemical stability of widely used, promising nonmetallic components and solid lubricants of friction metalloceramic materials are described. Recommendations are made as to their application as high-temperature solid lubricants for friction materials of heavy-load braking devices: boron nitride, 2-calcium fluoride and synthetic mica. 6 ill., 1 table, 7 ref. Resume.

1/1

- 105 -

USSR

UDC 615.21.547.665

MARKAVA, E. YA., AREN, A. K., and GERMANE, S. K., Institute of Organic Synthesis, Academy of Sciences LatvianSSSR, Riga

"Synthesis and Physiological Activity of 2,2'-Diamino-2,2'-(phenylene)-bis-indanediones-1,3"

Moscow, Khimiko-Farmatsevticheskiy Zhurnal, Vol 7, No 5, May 73, pp 30-33

Abstract: It has been shown that 2,2'-dibromo-2,2'-(p-phenylene)-bis-indanediones-1,3 react via nucleophilic halogen exchange with primary and secondary amines in anhydrous dioxane or ether to yield 2,2'-diamino-2,2'-(p-phenylene)-bis-indanediones-1,3. A series of derivatives was prepared, all compounds showing some tranquilizing action; amino-m-phenylene-bis-indanediones exhibited higher activity than the p-phenylene homologs. Compounds with the dimethylamino group in their structure were more active than comparables diethylamino derivatives. A transition from p-phenylene to m-phenylene derivatives resulted in disappearance of the analgesic activity.

1/1



USSR

UDC 615.213:547.754

OZOLIN SH, Ya. V., and GERMANE, S. K., Institute of Organic Synthesis,  
Academy of Sciences Latvian SSR

"Study of the Pharmaceutical Properties of Some 2-( $\delta$ -aminobutynyl) Indane-  
-1,3-diones and 2-( $\delta$ -aminobutynyl) Indane-1,3-diols. II. A Study of the  
Tranquilizing Properties"

Riga. Izvestiya Akademii Latviyskoy SSR, 1972, No 11(304), pp 97-101

Abstract: Thirty specific indanes were tested for toxicity (LD<sub>50</sub> method) and tranquilizing properties in white mice. The substitutions occurred on the 2-carbon of the indane ring and on the terminal nitrogen. A study of the drugs' influence of muscle tone and coordination was also performed. All compounds tested indicated some tranquilizing action. The greatest effect was demonstrated by the phenylindanes, having a phenylpiperazine radical at the terminal nitrogen. The least effect was demonstrated by those compounds having a quaternary nitrogen, i.e., those derived from the iodide salt of the indane-dione. The dione and its corresponding diol did not differ significantly in their tranquilizing effect.

1/1

USSR

UDC 615.21:547.665

AREN, A. K., BERZINYA, I. A., GEYTA, L. S., and GERMANE, S. K., Institute of Organic Synthesis Ac. Sc. Latvian SSR

"2-[γ-(N-Arylpiperazino)propyl]-2-arylindandiones-1,3 and -indandiol-1,3"

Moscow, Khimiko-Farmatsevticheskiy Zhurnal, Vol 4, No 12, Dec 70, pp 6-10

Abstract: In continuation of the search for neuro- and psychotropic agents, a series of title compounds was synthesized. To 2.3 g sodium dissolved in 200 ml of n-propanol, 22.5 g 2-phenylindandione-1,3, 24 g 1,3-dibromopropane, and 14.9 g NaI are added and refluxed for 8-10 hrs. The solution is then cooled, poured into water, the separated oil phase is dissolved in benzene, washed with sodium bicarbonate solution and dried over magnesium sulfate. Benzene is evaporated and the 2-(γ-bromopropyl)-2-phenylindandione-1,3, m.p. 88° is isolated by chromatography on an alumina column. Analogously 2-(γ-chloropropyl)-2-(p-methoxyphenyl)-indandione-1,3, b.p. 160-70°/10<sup>-2</sup> mm Hg, and 2-(γ-hydroxypropyl)-2-phenylindandione-1,3, m.p. 78° were prepared. To convert these intermediates to 2-[γ-(N-arylpiperazino)-propyl]-2-arylindandiones-1,3, above compounds were dissolved in benzene and respective N-arylpiperazines in benzene were added, the mixture being refluxed for 1/2

USSR

AREN, A. K., et al, Khimiko-Farmatsevticheskiy Zhurnal, Vol 4, No 12, Dec 70, pp 6-10

0.5-1 hr, cooled, and filtered. The precipitated hydrochloride is saturated with HCl, the product filtered, suspended in water, aqueous ammonia is added and the only product crystallized in alcohol. Pharmacological studies showed all compounds to exhibit tranquilizing activity, the most active being the m-substituted arylpiperazine derivatives. All of the indandio-1,3 derivatives exhibited toxicity which increased with the increased number of methyl groups between the diketo group and N-aryl piperazine.

2/2

- 38 -

USSR

UDC 576.858.73.095.57

VORONTSOVA, T. V., GERMANOV, A. B., and SOKOLOV, M. I., Institute of Virology  
imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow

"Induction of S-Mutation in Fowl Plague Virus by Ethylenimine"

Moscow, Voprosy Virusologii, No 4, Jul/Aug 71, pp 416-421

Abstract: Four mutants, formed spontaneously or induced by ethylenimine, were isolated from a population of the L<sub>82</sub> large-plaque strain of fowl plague virus: a micro-plaque mutant, a small-plaque mutant which was stimulated by protamine sulfate, a small-plaque mutant which was not stimulated by protamine sulfate, and a medium-plaque mutant. All mutants were genetically stable. Ethylenimine was very effective in inducing mutations when it was applied to a reproducing population of fowl plague virus. Optimal conditions for induction of S-mutations with ethylenimine were established. A correlation was found to exist between the lethal and mutagenic effects on one hand and the stage of virus replication on the other hand. The most pronounced lethal and mutagenic effects took place when ethylenimine was applied in the first two hours of virus replication.

1/1

- 10 -

1/2 011 UNCLASSIFIED PROCESSING DATE--18SEP70  
TITLE--GENETIC MARKERS OF HERPES SIMPLEX VIRUS COMMUNICATION 2:  
INVESTIGATION OF GENETIC MARKERS OF THE US STRAIN OF HERPES SIMPLEX  
AUTHOR--(04)--RUDNEVA, I.A., GERMANOV, A.G., MYASNIKOVA, I.A., SOKOLOV, M.I.  
COUNTRY OF INFO--USSR  
SOURCE--VOPROSY VIRUSOLOGII, 1970, NR 2, PP 182-186  
DATE PUBLISHED-----70  
SUBJECT AREAS--BIOLOGICAL AND MEDICAL SCIENCES  
TOPIC TAGS--HERPES SIMPLEX VIRUS, TISSUE CULTURE  
CONTROL MARKING--NO RESTRICTIONS  
DOCUMENT CLASS--UNCLASSIFIED  
PROXY REEL/FRAME--1990/0729 STEP NO--UR/0402/70/000/002/0182/0186  
CIRC ACCESSION NO--AP0108935  
UNCLASSIFIED

2/2 011

UNCLASSIFIED

PROCESSING DATE--18SEP70

CIRC ACCESSION NO--AP0108935

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. A VARIANT OF THE US STRAIN OF HERPES SIMPLEX VIRUS PRODUCING A CYTOPATHIC EFFECT IN HUMAN EMBRYO AND CHICK EMBRYO FIBROBLAST CULTURES WAS STUDIED. DIFFERENT SENSITIVITY OF THE US STRAIN TO SULFATED AGAR POLYSACCHARIDES DEPENDING ON THE TYPE OF CELL CULTURE WAS DEMONSTRATED: COMPLETE INHIBITION OF PLAQUE PRODUCTION WAS OBSERVED ONLY IN CHICK EMBRYO FIBROBLAST CULTURE BUT NOT IN HUMAN EMBRYO FIBROBLASTS. THE VARIANT UNDER STUDY WAS FOUND TO BE SENSITIVE TO 5,BROMODEOXYURIDINE AND TO BE INCAPABLE OF REPRODUCTION AT HIGH TEMPERATURE.

UNCLASSIFIED

1/2 024 UNCLASSIFIED PROCESSING DATE--18SEP70  
TITLE--GENETIC MARKERS OF HERPES SIMPLEX VIRUS COMMUNICATION 1: SOME  
GENETIC MARKERS OF K STRAIN OF HERPES SIMPLEX VIRUS OF THE SECOND  
AUTHOR--(03)-GERMANOV, A.G., RUDNEVA, I.A., SOKOLOV, M.I.  
COUNTRY OF INFO--USSR  
SOURCE--VOPROSY VIRUSOLOGII, 1970, NR 2, PP 166-170  
DATE PUBLISHED-----70  
SUBJECT AREAS--BIOLOGICAL AND MEDICAL SCIENCES  
TOPIC TAGS--HERPES SIMPLEX VIRUS, TISSUE CULTURE, MICROORGANISM GENETICS,  
ANTIGEN, DRUG RESISTANCE, BROMINATED ORGANIC COMPOUND  
CONTROL MARKING--NO RESTRICTIONS  
DOCUMENT CLASS--UNCLASSIFIED  
PROXY REEL/FRAME--1990/0726 STEP NO--UR/0402/70/000/002/0166/0170  
CIRC ACCESSION NO--AP0108932  
UNCLASSIFIED

2/2 024

UNCLASSIFIED

PROCESSING DATE--18SEP70

CIRC ACCESSION NO--AP0108932

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. NINE CLONES OF THE K STRAIN OF HERPES SIMPLEX VIRUS PRODUCING OPAQUE PLAQUES IN CHICK EMBRYO FIBROBLAST CULTURES WERE ISOLATED. THESE CLONES JUST AS THE ORIGINAL STRAIN SHOWED NO CYTOPATHIC EFFECT IN CHECK EMBRYO FIBROBLAST CULTURES. MARKED AUTOINTERFERENCE OF PLAQUE FORMATION IN THE CLONES UNDER STUDY WAS DEMONSTRATED. THESE CLONES WERE FOUND TO INDUCE SYNTHESIS OF A SIGNIFICANT AMOUNT OF INTERFERON IN CHICK EMBRYO FIBROBLAST CULTURES. INVESTIGATION OF OTHER PROPERTIES, INCLUDING RESISTANCE TO 5,BROMODEOXYURIDINE AND CAPACITY FOR REPRODUCTION AT HIGH TEMPERATURE, PERMITS TO CHARACTERIZE THE ISOLATED CLONES OF THE K STRAIN AS ATYPICAL VARIANTS OF HERPES SIMPLEX VIRUS.

UNCLASSIFIED



Magnesium

USSR

UDC 669.72,669.73,539.26

GERMANOV, Ye. P., and SHIVRIN, O. N., Petrozavodsk State University imeni  
O. V. Kuusinen

"Dimensional Effect in Magnesium-Cadmium Alloys"

Sverdlovsk, Fizika Metallov i Metallovedeniye, Vol 30, No 4, Oct 70, pp  
892-894

Abstract: A study was made of the nature of distortion of the crystalline lattice of close-packed hexagonal solid solutions. Hardened and annealed Mg-Cd alloys (Cd from 5 to 20 at%) were investigated. All alloys in both the hardened and annealed states have a tendency toward short-range order, a fact which was substantiated by the shape of the curves of angular distribution of the diffusion phonon. In cadmium-base alloys the model of the elastic isotropic continuum in the first approximation is fully acceptable. The atoms of the diffusing component Mg change its state to a great extent as compared to the atoms of diffuser Cd.

1/1

1/2 033 UNCLASSIFIED PROCESSING DATE--04DEC70  
TITLE--THERMAL DIFFUSION SCATTERING OF X RAYS IN HEXAGONAL POLYCRYSTALS  
-U-  
AUTHOR--(02)-GERMANOV, YE.P., SHIRVIN, O.N.  
COUNTRY OF INFO--USSR  
SOURCE--FIZ. TVERD. TELA 1970, 12(4), 1228-31  
DATE PUBLISHED-----70  
  
SUBJECT AREAS--PHYSICS  
  
TOPIC TAGS--THERMAL DIFFUSION, X RAY SCATTERING, DEBYE TEMPERATURE, HEAT  
CAPACITY, CRYSTAL, THERMAL EFFECT, MAGNESIUM, CADMIUM  
  
CONTROL MARKING--NO RESTRICTIONS  
  
DOCUMENT CLASS--UNCLASSIFIED  
PROXY REEL/FRAE--3002/0213 STEP NO--UR/0181/70/012/004/1228/1231  
  
CIRC ACCESSION NO--AP0127824  
UNCLASSIFIED

2/2 033  
CIRC ACCESSION NO--AP0127824

UNCLASSIFIED

PROCESSING DATE--04DEC70

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. IN TERMS OF THE DEBYE THEORY OF HEAT CAPACITY OF CRYSTALS, IT IS POSSIBLE TO APPLY A PREVIOUSLY DERIVED EXPRESSION FOR THE MODULATION OF THERMAL SCATTERING OF X RAYS TO HEXAGONAL POLYCRYSTALS. THE OBTAINED EXPRESSION OF THE MODULATING FUNCTION OF THERMAL DIFFUSE SCATTERING WAS VERIFIED BY COMPARISON WITH MEASURED THERMAL SCATTERING OF X RAYS ON PURE SPECIMENS OF MG AND CD. SATISFACTORY AGREEMENT WAS OBTAINED BETWEEN EXPT. AND CALCNS.  
FACILITY: PETROZAVODSK. GOS. UNIV. IM. KUUSINENA, PETROZAVODSK, USSR.

UNCLASSIFIED

Acc. Nr: **AP0037235**

Ref. Code: UR 0301

PRIMARY SOURCE: Voprosy Meditsinskoy Khimii, 1970, Vol 16,  
Nr 1, pp 28-31

DISORDER IN ACCEPTOR FUNCTION OF TRANSFER RNA's FROM RABBIT  
LIVER AT INSULIN INSUFFICIENCY

Ya. L. Germanuk, V. I. Mironenko

The Laboratory of Biochemistry Research Institute of Endocrinology and Metabolism, Kiev

The insulin insufficiency by means of alloxan administration has been induced in rabbits. From livers of both diabetic and healthy animals the total sRNA and aminoacyl RNA-synthetases have been isolated. The level of aminoacyl sRNA formation was studied. It was noted that "diabetic" sRNA less effectively accepts I-C<sup>14</sup>-lysine, I-C<sup>14</sup>-methionine and I-C<sup>14</sup>-leucine under catalytic action of "diabetic" as well as "healthy" aminoacyl RNA synthetases. At the same time "healthy" RNA's with "healthy" synthetases do it more readily. From these results one may conclude that one of the possible reasons for decreased level of aminoacyls sRNA formation in the liver of animals with insulin insufficiency is transfer RNA itself.

D. N.

4/1  
REEL/FRAME  
**19730160**

2

USSR

UDC 669.15'27-194

STROGANOV, A. I., PYL'NEV, Yu. A., CHERNYSHEV, E. Ya., KEYS, N. V., PAKULEVA, V. S., DONETS, I. D., KHOLODOV, Yu. A., and GERMELIN, F. A., Chelyabinsk Polytechnical Institute; Chelyabinsk Metallurgical Plant

"Tungsten Losses in the Production of High-Speed Steel"

Moscow, Metallurg, No 1, Jan 71, pp 21-23

Abstract: Data are presented on seven melts of R18, R12, and R6M3 high-speed steels, an analysis is made of tungsten electric steelmelting and forge conversion processes, and methods are presented for utilizing scrap of tungsten-bearing steels. From the study the following conclusions can be made: as the tungsten content in the steel is increased, its assimilation decreases. A decrease in the proportion of tungsten through the ferro-alloys as well as a decrease in the consumption of oxygen for blowing facilitate a more complete assimilation of tungsten by the metal. A substantial portion of tungsten is lost with the scrap and reguli in the slag (0.34%), the emery dust, and scale during forging. A thorough extraction of tungsten from slag and scale is suggested. Means for reducing tungsten losses in the process of heating castings and ingots in the furnaces include  
1/2

USSR

STROGANOV, A. I., et al, Metallurg, No 1, Jan 71, pp 21-23

in nonoxidizing atmosphere, more rapid heating, and application of a protective coating to ingots prior to heating. To decrease decarburization and scale formation, the Chelyabinsk Metallurgical Plant has recently been using coatings comprising refractory clay (20%), M40 carborundum powder (6%), fine graphite (6%), commercial borax (3%), and liquid glass (65%).

2/2

- 65 -

USSR

UDC 612.014.424.2+612.172.2+612.12.216

~~GERMER, M. Z.~~, Latvian Scientific Research Institute of Experimental and  
Clinical Medicine, Ministry of Health, Latvian SSR

"Effect of a Static Electric Field on the Cardiac and Respiratory Rate in  
the Rat"

Riga, Izvestiya Akademii Nauk Latviyskoy SSR, No 2, 1971, pp 102-106

Abstract: The effect of a static electric field (1,500 to 2,250 v/cm) on  
the cardiac and respiratory rates of grounded rats under nembutal anesthesia  
was investigated during and after 30 minutes' exposure. Changes in the  
cardiac rate were the same as in the control. The slight decrease noted  
in both groups was apparently caused by the anesthesia, for the rate  
gradually increased toward the end of the experiment when the rats began to  
awaken. The static electric field slowed the respiratory rate slightly  
compared with the control, but the difference was statistically insignificant.

1/1

USSR

UDC: 518.90

GERMEYER, Yu. B.

"Theory of Three-Player Games"

Moscow, Zhurnal vychislitel'noy Matematiki i Matematicheskoy Fiziki, No 6, 1973, pp 1459-1468

Abstract: The author finds it useful to continue studying the approach to game theory known as the principle of best guarantee of results. This approach has been applied in the investigation of nonantagonistic games involving two players. Since it has proved successful in the theory of hierarchical systems and the theory of "meta-games," it is used in the present paper for the theory of games with three participants involving mutual information exchanges among the players and the order of their moves. A number of variants of the problem are considered.

1/1



C. Operations Research

USSR

GERMEYER, YU. B.

"Study of Operations and Games Theory"

Teoriya Igr [Games Theory -- Collection of Works], Yerevan, 1973,  
pp 125-127 (Translated from Referativnyy Zhurnal Kibernetika, No 10,  
1973, Abstract No 10V428)

Translation: The relationships between operations research and games theory are redefined by introducing undefined factors and the concept of strategies as functions of greater information content concerning an operating individual than those of operations research (one variety of undefined factor is the incomplete knowledge of the effectiveness criterion). The principle of best guaranteed result (maximin) is suggested as a rather universal principle for selection of strategies under conditions of uncertainty.

1/1

USSR

UDC: 518.9

GERMEYER, Yu. B., SUKHORUCHENKO, E. M.

"Optimum Distribution of Resources in Attempting to Reach a Given Effectiveness on All Sections"

V sb. Kibernetiku -- na sluzhbu kommunizmu. T. 6 (Cybernetics in the Service of Communism--collection of works. Vol 6), Moscow, "Energiya", 1971, pp 233-248 (from RZh-Matematika, No 11, Nov 71, Abstract No 1V667)

Translation: A game is considered in which the strategies of the first player are vectors  $x = (x_1, x_2, \dots, x_n)$  which satisfy the conditions

$$\sum_{i=1}^n x_i = X_0, \quad x_i \geq 0,$$

while the strategies of the second player are vectors  $y = (y_1, y_2, \dots, y_n)$  which satisfy the conditions

$$\sum_{i=1}^n y_i = Y_0, \quad y_i \geq 0.$$

1/2

USSR

GERMEYER, Yu. B., SUKHORUCHENKO, E. M., Kibernetiku -- na sluzhbu kommunizmu. T. 6, Moscow, "Energiya", 1971, pp 233-248

The first player attempts to satisfy the conditions  $f_i(x_i, y_i) \leq w_i$  for all  $i$ , which can be achieved by maximization with respect to the function  $\Phi(x, y) = \min(f_i(x_i, y_i) - w_i)$ . The pure (maxmin) strategy for the first player is determined for varied information on the second player's strategy. The game is generalized to the case where  $x_i, y_i$  are vectors. L. Bregman.

2/2

- 26 -

USSR

GERMEYER, Yu. B., MOYSEYEV, N. N.

"Some Problems in the Theory of Hierarchical Control Systems"

Probl. Prikl. mat. i Mekh. [Problems of Applied Mathematics and Mechanics -- Collection of Works], Moscow, Nauka Press, 1971, pp 30-43, (Translated from Referativnyy Zhurnal, Kibernetika, No 3, 1972, Abstract No 3 V463 from the Resume).

Translation: A number of problems are stated on the optimization of the results of operation of a system consisting of a center and producer when their interests do not coincide. Control by means of distribution of resources among producers by the center is studied and the corresponding problems in optimal control are stated. An example is used to show that control of resources from the standpoint of the interests of the center may be ineffective. Then, control using a system of rewards and penalties is studied in a linear statement. With a sufficient range in the system, complete controlability of producers in the interests of the center is demonstrated. The corresponding optimization problems are formulated in general form. The initial point of this control system is the assumption of precise knowledge of the interests and behavior of the producers by the center. Complications arising if the information is inaccurate are indicated.

1/1

USSR

GERMEYER, Yu. B.

"Games Concepts in Systems Research"

Issled. Sistem. Materialy Vses. Simpoz. [Systems Research. Materials of All-Union Symposium], Moscow, 1971, pp 50-64, (Translated from Referativnyy Zhurnal, Kibernetika, No 2, 1972, Abstract No 2 V635).

NO ABSTRACT.

1/1

USSR

UDC: 51

GERMEYER, Yu. B.

"Introduction to the Theory of Operations Research"

Vvedeniye v teoriyu issledovaniya operatsiy (cf. English above), Moscow, "Nauka", 1971, 383 pp, ill. 1 r. 55 k. (from RZh-Kibernetika, No 1, Jan 72, Abstract No 1V740 K)

Translation: Chapter 1: On Formalization and Basic Principles of Operations Research; Chapter 2: Evaluating the Effectiveness of Strategies (Decisions); Chapter 3: Optimum Strategies.

1/1

USSR

UDC: 518.9

GERMEYER, Yu. B., SUKHORUCHENKO, E. M.

"Optimum Distribution of Resources When Attempting to Reach a Predetermined Effectiveness on All Sections"

V sb. Kibernetiku -- na sluzhbu kommunizmu (Cybernetics to the Service of Communism -- collection of works), T. 6, Moscow, "Energiya", 1971, pp 233-248 (from RZh-Kibernetika, No 11, Nov 71, Abstract No 11V667)

Translation: The authors consider a game in which the strategies of the first player are the vectors  $x = (x_1, x_2, \dots, x_n)$  which satisfy the conditions

$$\sum_{i=1}^n x_i = X_0, \quad x_i \geq 0, \quad (1)$$

and the strategies of the second player are the vectors  $y = (y_1, y_2, \dots, y_n)$  which satisfy the conditions

$$\sum_{i=1}^n y_i = Y_0, \quad y_i \geq 0. \quad (2)$$

1/2

USSR

GERMEYER, Yu. B., SUKHORUCHENKO, Yu. M., Kibernetiku -- na sluzhbu kommunizmu, T. 6, Moscow, "Energiya", 1971, pp 233-248

The first player attempts to ensure fulfillment of the conditions  $f_i(x_i, y_i) \geq w_i$  for all  $i$ , which is achieved for instance by maximizing the function  $\Phi(x, y) = \min_i (f_i(x_i, y_i) / w_i)$ . The pure (maximum) strategy of the first player is deter-

mined for various information on the strategies of the second player. The game is generalized to the case where  $X, Y, x_i, y_i$  are vectors. L. Bregman.



USSE

UDC: 518.9

GERMEYER, Yu. B.

"Game Concepts in Systems Analysis"

Metody upr. bol'shimi sistemami. T. 1 (Methods of Controlling Large Systems. Vol 1), Irkutsk, 1970, pp 4-24 (from RZh-Kibernetika, No 9, Sep 71, Abstract No 9V467)

Translation: The author considers coalitionless games in which one of the players is assumed to be disinterested (this player may be interpreted as nature, generating uncontrollable factors, and uncertainties in the goals of the players which are indistinguishable from these factors), while one other player is set apart and is called the operating side. Certain classes of games are described in this terminology.

The principle of optimality is defined as some functional expression for the goal of the operating side in terms of the goals of the other players. These principles may lead the other players to enter into a coalition. The author proposes using the principle of the guaranteed result to evaluate the effectiveness of the system, and as a basis for making recommendations on selecting strategies. N. Vorob'yev.

1/1

- 28 -

USSR

UDC 51.330.115

GERMEYER, Yu. B.

"Reduction of Vector Effectiveness Criteria to a Single Criterion with Uncertainty in Convolution Parameters"

Kibernetiku -- na Sluzhbu Kommunizmu. T. 6 [Cybernetics in the Service of Communism, Vol 6 -- Collection of Works], Moscow, Energiya Press, 1971, pp 175-184, (Translated from Referativnyy Zhurnal, Kibernetika, No 10, 1971, Abstract No 10 V662 by M. Kazakova).

Translation: Various methods of reduction of partial criteria of effectiveness to a single criterion are studied. The most general method suggested is

$$F(x, y) = \min_{\lambda \in E} \left[ \sum_{i=1}^n \lambda_i f_i(x, y) + \lambda_0 \right], \quad (1)$$

where  $x$  are the factors tested,  $y$  are untested factors,  $\lambda = \{\lambda_0, \lambda_1, \dots, \lambda_n\}$ ,  $E$  is a certain set of possible changes in vectors  $\lambda$ . The purpose of the operation is to increase the values of  $F(x, y)$ . An informal interpretation of formula (1) is also presented, related to the lack of information on values of  $\lambda_i$  with various assumptions concerning the form of set  $E$ .

1/1

- 20 -

USSR

UDC: 550.834

ALABUZHEV, P. M., GALYNIN, N. A., GERNER, I. I., GRITCHIN, A. A., ZUYEV, A. K., NIKITIN, A. A., KHON, V. F., Novosibirsk Electrical Engineering Institute

"A Seismic Receiver"

Moscow, Otkrytiya, Izobreteniya, Promyshlennyye Obraztsy, Tovarnyye Znaki, No 36, Dec 71, Author's Certificate No 322742, Division G, filed 8 Apr 70, published 30 Nov 71, p 154

Translation: This Author's Certificate introduces a seismic receiver which contains a housing, an inertial mass and a displacement registering device. As a distinguishing feature of the patent, the sensitivity of the receiver is improved and the measurement range is extended by suspending the inertial mass on two preformed flat elastic strips which are securely fastened by their ends to the housing. The strips are securely fastened in the middle above and below to the inertial mass, and regulating screws press against the end faces of the strips.

1/1

- 138 -

1/2 011 UNCLASSIFIED  
TITLE--CATALYST FOR METHANOL SYNTHESIS -U-

PROCESSING DATE--04DEC70

AUTHOR--(04)-SUSHCHAYA, L.E., BONDAR, P.G., GERNET, D.V., LELEKA, V.E.

COUNTRY OF INFO--USSR

SOURCE--U.S.S.R. 264,355

REFERENCE--OTKRYTIYA, IZOBRET., PROM. OBREZTSY, TOVARNYE ZNAKI, 1970 47

DATE PUBLISHED--03MAR70

SUBJECT AREAS--CHEMISTRY

TOPIC TAGS--METHANOL, CATALYTIC ORGANIC SYNTHESIS, CHEMICAL PATENT, ZINC  
OXIDE, CHROMIUM OXIDE

CONTROL MARKING--NO RESTRICTIONS

DOCUMENT CLASS--UNCLASSIFIED  
PROXY REEL/FRA--3007/0846

STEP NO--UR/0482/70/000/000/0000/0000

CIRC ACCESSION NO--AA0136280

UNCLASSIFIED

2/2 011

UNCLASSIFIED

PROCESSING DATE--04DEC70

CIRC ACCESSION NO--AA0136280

ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THE TITLE CATALYST, CONSISTING OF ZNO AND CRO, CONTAINS NH SUB4 TUNGSTATE, NH SUB4 MOLYBDATE, AND URANYL NITRATE THAN CAN BE BROKEN DOWN EASILY TO THE CORRESPONDING OXIDES, AND WHICH WEIGH 0.001-2.0 WT. PERCENT (PREFERABLY 0.001-0.1 WT. PERCENT) OF THE CORRESPONDING OXIDE.

UNCLASSIFIED

USSR

UDC 543.27:628.512

PEREGUD, YE. A., RYKHOVSKAYA, M. S. (deceased), and GERNET, YE. V.

"Rapid Methods for Determination of Harmful Substances in Air"

Moscow, "Khimiya" Publishing Company, 1970

Abstract: The apparatus, methods of sampling and rapid methods for the determination of toxic substances in air are described in this book. Domestic and foreign-made gas analyzers, both stationary and portable ones are described as well as methods for the preparation of mixtures with known gas composition for calibration of the instruments and testing the methodology. The book is intended for workers in scientific research institutes, sanitation-epidemiologic and gas-safety stations, plant laboratories and other organizations involved in atmospheric studies. There are 142 figures, 12 tables and 377 literature references in the book.

1/1

- 20 -

Analytical Chemistry

USSR

UDC 543.27:628.512

PEREGUD, YE. A., BYKHOVSKAYA, N. S. (Deceased), and GERMET, YE. V.

"Rapid Methods for Determination of Harmful Substances in Air"

Moscow, "Khimiya" Publishing Company, 1970

Translation: Table of Content

Foreword	10
Introduction	11
Chapter I. Air sampling methods and methods for preparation of air-toxic substances mixtures	17
Air sampling	17
Preparation of air-toxic substances mixtures	29
Literature	57

USSR

PEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Chapter II. Methods for analysis of toxic substances	58
Ammonia and aliphatic amines	59
Linear-color test determination	59
Colorimetric determination in solution	60
Determination of ammonia, aliphatic amines and ethylene oxide by means of test paper	62
Colorimetric determination of aliphatic amines with bromothymol blue	63
Linear-color test determination of monoethanolamine and ammonia with ninhydrine	64
Other methods for determination	65
Colorimetric determination of hydrazine hydrate	65
Nitrogen Oxides	67
Colorimetric determination of nitrogen dioxide in solution	67
Colorimetric determination of nitrogen dioxide by means of indicator tubes	68

2/24



USSR

PEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Linear-color test determination of nitrogen dioxide on the UG-1 apparatus	70
Linear-color test determination of nitrogen oxides (oxide and dioxide)	71
Colorimetric determination of nitrogen dioxide by the benzidine and $\beta$ -naphtol reaction	72
Other methods for determination of nitrogen dioxide and of its combined content with nitrogen oxide	73
Hydrogen Sulfide	74
Linear-color test determination	75
Colorimetric determination by means of test paper	75
Colorimetric determination in solution	77
Other methods of determination	78
Linear-color test determination of hydrogen sulfide in presence of sulfur dioxide	79

3/24

USSR

PEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Carbon disulfide	79
Colorimetric determination of carbon disulfide and hydrogen sulfide in presence of each other	79
Sulfurous anhydride (sulfur dioxide)	81
Linear-color test determination by the reaction with sodium nitroprusside	82
Linear-color test determination with starch iodide solution	83
Linear-color test determination with potassium iodide	85
Colorimetric determination in solution by the reaction of iodine reduction	86
Colorimetric determination by means of test paper	87
Colorimetric determination with the fuchsine formaldehyde reagent	88
Other methods for determination	90

4/24

USSR

PEREGUD., YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Sulfuric acid (mist)	91
Colorimetric determination by means of test paper (semiquantitative)	91
Colorimetric determination by means of indicator film	93
Linear-color test determination of the sulfuric, hydrochloric and hydrofluoric acids	93
Hydrogen arsenide (arsine)	94
Colorimetric determination by means of test paper	94
Hydrogen phosphide (phosphine)	97
Linear-color test determination	97
Hydrogen antimonide (stibine)	98
Colorimetric determination	99
Hydrogen cyanide (prussic acid)	99
Linear-color test determination	99
Colorimetric determination by means of test paper	101
Colorimetric determination with pyridine-barbiturate reagent	102

5/24

USSR

FEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Accelerated colorimetric determination	104
Other methods of determination	105
Isocyanates	106
Accelerated colorimetric method for determination of the vapors of 2,4-toluidenediisocyanate	107
Accelerated colorimetric method for determination of 4,4'-diisocyanatediphenylmethane	108
Hydrogen fluoride	109
Colorimetric determination in solution	109
Linear-color test determination	110
Colorimetric determination by means of test paper	111
Other methods of determination	111
Fluorine	112
Linear-color test determination	112
Colorimetric determination	113

6/24

USSR

PEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Chlorine	114
Linear-color test determination	115
Colorimetric determination	115
Colorimetric determination in solution	116
Colorimetric determination by means of benzidine test paper	117
Colorimetric determination by means of fluorescent test paper	118
Other methods of determination	119
Hydrogen chloride	119
Linear-color test determination	119
Bromine	121
Colorimetric determination	122
Linear-color test determination	122
Colorimetric determination by the reaction with reduced strychnine	123
Other methods of determination	124

7/24

USSR

FEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Iodine	124
Colorimetric determination	124
Ozone	125
Luminescence method	125
Linear-color test determination	126
Colorimetric determination by means of test paper	126
Colorimetric determination with the application of indicator tubes	127
Other methods of determination	128
Hydrogen peroxide	129
Colorimetric determination by means of test paper	129
Lead and its inorganic compounds	131
Colorimetric determination by means of test paper	131
Colorimetric determination in solution	133
Colorimetric determination on paper	134

8/24

USSR

PEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Tetraethyllead (TEL)	135
Colorimetric determination by means of indicator tubes	136
Determination by the reaction with iodine (semiquantitative)	137
Mercury	138
Detection of mercury vapors in air	138
Colorimetric determination in solution	139
Colorimetric determination with application of indicator tubes	139
Linear-color test determination	140
Other methods of determination	142
Determination of ethylmercurychloride vapors	143
Zinc oxide	144
Colorimetric determination by means of test paper	144
Other methods of determination	145
Microdetermination of zinc by means of color pencil	145

9/24

USSR

FEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Chromic anhydride	146
Colorimetric determination by means of test paper	146
Nickel carbonyl	147
Colorimetric determination	147
Linear-color test determination by the reaction with silver nitrate	148
Linear-color test determination by the reaction with phosphomolybdenovanadic acid	149
Other methods of determination	150
Carbon dioxide (carbonic anhydride, carbonic acid gas)	150
Colorimetric determination	151
Indicator method	152
Linear-color test determination with thymolphthalein	153
Other methods of determination	154

10/24



USSR

PEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Carbon monoxide	154
Linear-color test determination	155
Colorimetric determination with application of indicator tubes	157
Colorimetric determination by the reaction with silicon-molybdic acid	159
Other methods of determination	160
Benzidine (4,4'-diaminodiphenyl)	160
Colorimetric determination by the indamine reaction	160
Colorimetric determination with p-dimethylaminobenzaldehyde or p-diphenylaminobenzaldehyde	161
Gasoline	162
Linear-color test determination	162
Colorimetric determination by the reaction of reduction of chromic anhydride	164
Emulsion method	165
Linear-color test determination of petroleum fractions (light kerosene, fuels T-2, T-4, TS-1 and white-spirit)	166

11/24

USSR

PEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Benzene	167
Linear-color test determination	167
Linear-color test determination of benzene and its homologues	168
Other methods of determination	169
Toluene	170
Linear-color test determination	170
Other methods of determination	171
Xylene	171
Linear-color test determination	171
Accelerated colorimetric method for determination of xylene and toluene	173
Linear-color test determination of technical xylene	174
Determination of benzene and its homologues	174
Diethyl ether (ethyl ether, petroleum ether)	175
Linear-color test determination	175

12/24

USSR

\* PEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Acetylene	177
Colorimetric determination in solution	177
Linear-color test determination	178
Phosgene	179
Colorimetric determination by means of test paper	180
Colorimetric determination by means of indicator pencils (semiquantitative)	182
Other methods of determination	183
Chloroorganic compounds	183
Determination by flame test method	184
Trichloroethylene	185
Linear-color test determination	186
Other methods of determination	187
Freon-22	187
Linear-color test determination	187

13/24

USSR

PEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Aniline	188
Colorimetric determination by the indophenol reaction	189
Linear-color test determination	190
Colorimetric determination by means of test paper	190
Colorimetric determination by means of test paper (semi-quantitative)	191
Colorimetric determination with p-dimethylaminobenzaldehyde	192
Other methods of determination	193
Dimethylaniline	194
Colorimetric determination	194
Diethylaniline	195
Colorimetric determination	195
Ethyl alcohol	195
Colorimetric determination with application of indicator tubes	196
Methyl alcohol	197
Linear-color test determination	197

14/24

- 14 -

USSR

PEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Tertiary alcohols of the fatty series and lower ketones	199
Linear-color test determination	199
Formaldehyde (formic aldehyde)	200
Colorimetric determination with application of indicator tubes	200
Linear-color test determination	201
Colorimetric determination in solution	202
Other methods of determination	202
Acrolein	203
Colorimetric determination	203
Furfurol	204
Colorimetric determination	205
Acetone (dimethyl ketone)	205
Colorimetric determination	206
Linear-color test determination	207
Colorimetric determination of carbonyl compounds -- acetone, methylethyl ketone, formaldehyde, acetaldehyde, prorion aldehyde, acroleine, butyraldehyde, crotonaldehyde	208
15/24	

USSR

PEREGUD, YE. A., et.al., "Rapid Methods for Determination of Harmful Substances in Air"

Colorimetric determination of acetone vapors and acet-	
aldehyde	209
Phenol (carbolic acid)	210
Colorimetric determination	210
Oil spray (mineral oil)	211
Determination of the mineral oil sprays	212
Styrene (phenylethylene, vinylbenzene)	212
Colorimetric determination	212
Alkylchlorosilanes	213
Accelerated colorimetric determination	213
Literature	214
Chapter III. Gas Analyzers	220
Optical gas analyzers	222
Automatic photoelectric gas analyzer for determination of	
arsine, hydrogen sulfide, chlorine, ozone and mercury vapors	222

16/24

USSR

PEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Universal photocolormetric tape gas-analyzer FL-5501	226
Photocolormetric gas-analyzer FKG-2 for determination of hydrogen sulfide	226
Recording analyzer for determination of hydrogen sulfide	230
Photocolormetric gas-analyzer FKG-3 for determination of chlorine	230
Photocolormetric gas-analyzer GSF-3 for determination of phosgene	231
Automatic gas-analyzer FG-6801 for determination of freon-12	232
An instrument for determination of tetraethyl lead	233
Photocolormetric gas-analyzer FK-5601 for determination of hydrogen sulfide	234
Portable apparatus "Imkometr" for determination of small concentrations of toxic materials in air	235
Automatic gas-analyzer "Chromoflux-K" for determination of toxic materials in air	237

17/24

USSR

PEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Colorimetric analyzer for continuous determination of noxious materials in air	237
Photocolorimetric gas-analyzer for determination of nitrogen oxides	238
Other instruments for determination of nitrogen oxides	241
Portable unit for determination of sulfur dioxide	241
Instrument for continuous determination of traces of sulfur dioxide with preliminary separation of interfering materials	243
Photoelectric instrument for dynamic analysis of air in industrial operations	245
Automatic signalizer of dangerous concentrations of ammonia and sulfur dioxide	246
Automatic signalizer of dangerous concentrations of hydrogen cyanide	247
Recording analyzer for determination of sulfur dioxide	248

18/24



USSR

PEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Automatic registering gas-analyzer type AGL-2, based on linear-color test method	250
Automatic instrument for determination of hydrogen fluoride	251
Photoelectric instrument for determination of mercury vapors	252
Mercury vapor concentration register IARF-450U	253
Gas-analyzer Uf-8101 for determination of nickel tetra-carbonyl vapors	255
Optico-acoustical gas-analyzer GA5501	256
Thermochemical gas-analyzers	256
Automatic stationary gas-analyzer TKH-2104 for determination of carbon monoxide	256
Portable gas-analyzer for determination of carbon monoxide	259
Gas-analyzer for carbon monoxide OS-3	260
Signalizer of the SGG-2 type for determination of burning gasses and vapors in air	261

19/24

USSR

PEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Portable gas-analyzer FGF-2MI for determination of burning gasses and vapors	262
Gas-analyzer for determination of explosive concentrations of gasoline vapors	264
Thermocatalytic, signalling analyzer of methane AMT-2 of continuous action	266
Electrochemical gas-analyzers	267
Gas-analyzer for automatic registration of sulfur dioxide	267
Portable unit for determination of sulfur dioxide in air	269
Gas-analyzer for determination of carbon monoxide	270
Conductometric gas-analyzer type "Ionoflux" made by "Hartman and Braun"	270
Instrument for determination of nitrogen oxides and nitric acid	272

20/24

USSR

PEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Conductometric apparatus for determination of carbon monoxide and hydrocarbons	272
Conductometric apparatus for determination of toxic substances	275
Conductometric apparatus for determination of carbon monoxide carbon dioxide and gasoline vapors	278
Portable apparatus for determination of sulfur dioxide	281
Coulomb-polarographic gas-analyzer GKP-1	282
Gas-analyzer for determination of ozone in air	285
Galvanic apparatus for determination of ozone	286
Analyzer for concurrent determination of ozone and sulfur dioxide	287
Electrochemical analyzer for determination of hydrogen cyanide	288
Apparatus for determination of hydrogen sulfide	290

21/24

USSR

PEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Ionization and emission analyzers	291
Portable apparatus for total determination of organic materials	291
Portable apparatus for determination of pentaborane	292
Apparatus for determination of mercury organic compound vapors	293
Apparatus for determination of organic lead compounds	293
Simplified apparatuses for rapid air analysis	294
Universal gas-analyzer UG-1	294
Universal gas-analyzer UG-2	297
Gas-determinator GKh-4	304
Apparatus for rapid determination of carbon monoxide	306
Gas-indicators of "Dreger" Company	309
Gas-analyzer-colorimeter	309
Portable apparatus for determination of sulfur dioxide	312
Portable apparatus for determination of carbon monoxide by means of test paper	313

22/24

- 18 -

USSR

PEREGUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Portable gas-analyzer for determination of carbon monoxide and dioxide	314
Apparatus for determination of carbon dioxide	316
Portable apparatus for determination of ethylene	317
Indicator apparatus LK-1 for determination of sulfur dioxide	319
Apparatus for rapid sampling and determination of toxic materials in large air volumes	319
Apparatus for rapid determination of noxious substances in air with application of test paper	321
Apparatus for determination of hydrogen sulfide	321
Miner's pocket indicator for determination of hydrogen sulfide	321
Portable gas-analyzer for determination of borohydrides	322
Indicator for explosive concentrations of methane and hydrogen	323
Apparatus for determination of oxygen and carbon dioxide	324
Gas-determinator for methane and carbon dioxide in mine air	326
Portable gas-analyzer OV2201 for determination of carbon dioxide	327

23/24

USSR

PERECUD, YE. A., et al., "Rapid Methods for Determination of Harmful Substances in Air"

Gas-determinator type GMT-3 for methane	327
Apparatus KAH-1 for determination of organic materials	328
Literature	329
Appendix	333
1. Conversion of volume concentration (1:1 000 000, 1 p.p.m.) to weight concentration (mg/l) for gasses and vapors	334
2. Characteristics of various types of silica gel (GOST 3956-64)	336
3. Maximum permissible concentrations of noxious gasses vapors, dust and other aerosols in air of the working zone of industrial buildings (SN 2455-63)	337
Subject index	351

Analytical Chemistry

USSR

UDC 543:615.9

PEREGUD, Ye. A. and GERNET, Ye. V.

Khimicheskiy Analiz Vozdukha Promyshlennyykh Predpriyatiy (Chemical Analysis of the Air of Industrial Enterprises), Issue No 2, Corrected and Supplements, Leningrad, "Khimiya," 1970, pp 2, 3-8, 9-12, 13-15

Translation:

Annotation: Methods of sanitary-chemical analysis of the air in industrial enterprises are described in the book; particular attention is given to the identification of toxic substances for which maximum allowable concentrations in the air of industrial premises have been established.

The second issue has been supplemented with methods for the determination of the maximum allowable concentrations (PDK) of new chemicals being introduced in industry. A number of methods described in issue one have been replaced by more rational and improved methods making possible the completion of the analysis faster, with a smaller volume of air, and with greater precision.

The book is intended for chemists working in analytical laboratories of industrial enterprises, sanitary-epidemiological stations, and scientific-research institutes. Illustrations: 24. Tables: 233

1/27

USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

Preface: Problems concerning the prevention of occupational intoxications and diseases are given a great deal of attention in Soviet sanitary legislation. The prophylaxis of occupational intoxications has become during the past few years one of the elements in the planning of new technological processes and industrial enterprises.

Not only do the organs of sanitary supervision exercise control in the course of the enterprise planning process, but also in the course of the practical implementation of the projects. These activities are being accomplished on a base of sanitary rules which stipulate the requirements with relation to the construction and maintenance of industrial enterprises of the different branches of industry and also working conditions when working with various toxic substances.

One of the basic directions of the struggle against acute as well as chronic occupational diseases is the hygienic standardization of the industrial environmental air, that is the establishment of maximum allowable quantities of toxic substances in the air of working premises.

Understood under the concept of maximum allowable concentrations (PDK) are such concentrations of different toxic chemical substances found in the

2/27

- 2 -



USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

air of industrial enterprises in the form of gases, vapors, and dust which despite their daily effect on the workers in the course of the working day and an unlimited duration of the working period will fail to induce any pathological changes or diseases detectable by modern means of investigation.\*

The established maximum allowable concentrations pertain to working areas understood to be areas where workers constantly or periodically remain for the purpose of supervision or operation of production processes. If the productions are carried out at different points of the working premise, then the entire premise is regarded as a working area.

Inasmuch as the respiratory tract (inspiration) is the main pathway through which a poisonous substance gains entry into the organism, the prevention of environmental air pollution is the main means of preventing the development of occupational intoxications.

---

\* LETAVET, A. A. Data on the proceedings of the International Symposium concerning maximum allowable concentrations of toxic substances in industry, Prague 1959.

3/27

USSR

PEFEGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

Organizations projecting a technological process, production equipment, and ventilating installations (in calculating air exchange), and also the organs which supervise industrial sanitation and hygienic control over the state of the environmental air at working premises must be guided by the legally established maximum allowable concentration values.

The air content of toxic substances at the level of maximum allowable concentrations can in no way be regarded as the optimum for the environmental air. All means at the disposition of modern technology are aiming to attain concentrations considerably smaller than those established, and in many cases bring these concentrations to zero value.

The maximum allowable concentrations of toxic substances are subjected to periodic reexamination. A comparison of the established values with concentration values found in the air of a working premise on the one hand, and the state of workers' health on the other hand provides a basis for changing the maximum allowable concentrations, and in a number of cases serves as an indication of the imperfection of the technological process from a hygienic point of view.

The practice of establishing norms in labor hygiene just as the practice of establishing norms in technology is closely linked with the methods used in measuring regulation values. Without the existence of such methods the  
4/27

USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2,3-8, 9-12, 13-15

establishment of maximum allowable concentrations loses its practical significance. These methods must possess sensitivity permitting the determination of values equal to those of PDK, and when possible conducted with the use of a small volume of air obtained in a brief fragment of time. The latter is of principal significance, for a prolonged period of sample gathering produces a mean value which fails to provide a representation of the briefly-lasting high concentrations exceeding the maximum established norms.

The control of the environmental air when linked with problems of establishing PDK norms, arbitrary analysis in particular, is a highly responsible type of analysis. Nevertheless, there are no handbooks which provide a summation of experience gained in analytical work in this direction and oriented toward the unification of the used methods.

The authors when compiling this practical handbook attempted to bridge this gap in literature concerning air analysis.

Methods described in Soviet and foreign literature and revised by the authors making them applicable in conditions for the establishment of norm values were used as materials for this book. For a considerable number of substances new methods have been developed.

5/27

USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2,3-8, 9-12, 13-15

Methods of identification of a large number of toxic substances for which PDK have been established in accordance with the list published in the sanitary norms for the projection of industrial enterprises. Sn 245-63 [Construction norms 245-63] with subsequent supplements are described.

A number of new methods mainly based on the application of catalysis, hemoabsorption, and new color reactions along with the methods for the determination of PDK most of which are utilized in the practice of sanitary-chemical analysis are described in the book.

The presence in the book of new and improved methods of detection of toxic substances in the air, and the presentation of the existing methods in accordance with the established maximum allowable concentration values permits the hope that the book will be useful to chemists working in the area of analysis of industrial environmental air.

The second issue of this handbook is supplemented by a considerable number of methods (more than 50) of determination of new chemical substances being introduced into industry.

A number of methods described in the first issue have been reexamined and replaced by more rational and improved methods making it possible to complete

6/27

- 4 -

USSR

PEREGUD, Ye, A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

an analysis faster, with a smaller volume of air, and with greater accuracy (hydrogen cyanide, vinyl chloride, hydrogen chloride, and others).

Particular attention is paid to group analytical methods with prospects of their application to the even larger number of toxic substances being used in industry (aliphatic amines, carbonyl compounds, halogen derivatives of hydrocarbons, and others).

Introduction: An air analysis of industrial enterprises has for its object the detection of gases, vapors, and aerosols which exert a harmful effect on the human organism.

The sources polluting the industrial environmental air are technological processes linked with the utilization or formation of toxic volatile substances.

With equipment inadequately hermetically sealed, particularly hazardous processes poorly encapsulated, and the absence of or use of inadequately effective sanitary technical devices, mainly ventilation, the concentrations of harmful admixtures in the air may attain values constituting a danger to the workers' health.

Soviet laws with regard to labor protection limit the degree to which the industrial environment can be polluted by establishing norms of maximum allowable concentrations of toxic gases, vapors, and dust in the air.

7/27

USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

The practice of establishing hygienic norms of maximum allowable concentrations of toxic substances requires a systematic control of the industrial air environment, and consequently the availability of sensitive and when possible selective methods of analysis.

The sanitary-chemical analysis of the air is one of the most complex branches of analytical chemistry. Concentrations of toxic substances when determined are expressed in tenths and frequently in 100ths of a milligram per cubic meter of air. In addition, the analyst frequently has to deal not only with individual substance, but also with multicomponent mixtures and highly complex analytical systems.

Through efforts of Soviet chemists during the past four decades a special branch of analytical chemistry known as Industrial-Sanitary Chemistry has been created and is continuing to develop. Its main object of investigation is the air of industrial enterprises.

In the period that has passed general positions with relations to the tasks confronting industrial hygiene in connection with the chemicoanalytical control of the air environment and original methods of detection of large quantities of toxic gases, vapors, and aerosols in the air were developed.

8/27

- 5 -

USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

Many of the photometric methods currently used in the different spheres of analytical chemistry -- hydro-chemical, biochemical, and other types of analysis -- had their beginning and subsequent development in the sphere of Industrial-Sanitary Chemistry.

The list of toxic substances for which PDK norms in the air have been established includes a considerable number of substances belonging to different groups of organic compounds: hydrocarbons, complex ethers, alcohols, and organo-chlorine compounds. Therefore, sensitive group methods along with methods of detection of individual substances are presented in the book.

The availability of functional and elementary methods for the micro-analysis of organic compounds broadens analytical potentials and opens ways for their application to new substances being introduced into industry. In this case all the analyst has to do is to determine the precise conditions applicable to the determination of the given concrete substance.

The group method of analysis acquires particular importance when used in a toxicological experiment conducted for the purpose of determining concentrations of studied toxic substances in a polluted chamber. Inasmuch as individual substances, as a rule, are being investigated, the search for a selective method becomes unnecessary.

9/27

USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

Most of the methods described in the book are based on the application of highly sensitive color reactions and belong to the colorimetric methods. The availability of special handbooks on the theory and practice of photometric analysis makes it unnecessary to dwell on the general regulations, methods, and procedures used in photometric analysis.

For the purpose of the photometry of colored solutions photometers and photocolorimeters of different makes, and standard series of solutions are widely used in the sanitary-chemical analysis of the air environment.

A detailed description of the method used for the preparation of a standard scale necessary for the visual photometry of color and the compilation of a calibration curve used in the application of photocolorimetry is provided in all of the colorimetric methods presented in the book.

The method of sample selection plays an important role in the analysis of the air in industrial premises. Depending on the aggregate condition of the substance, some other methods of its interception from the air are used. New methods of sample selection, modern filtering materials, solid absorbents used in quasi-liquid and in fluidized beds find their reflection in the book.

10/27

- 6 -



USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

Because of the great responsibility of the conclusions arrived at on the basis of the results of PDK determination, the authors have given particular attention to the prescribed portion of the method and creation of conditions ensuring the necessary sensitivity of the determination. This has been achieved by the selection of the appropriate reactions, concentration of the studied substance in a small volume of the solution, adjustment of conditions of sample selection in relation to the volume of and rapidity with which the air is being drawn. The sensitivity of the method is expressed in milligrams per cubic meter of air for the purpose of its convenient comparison with the established maximum allowable concentration, while the volume -- in liters (decimeter<sup>3</sup>). One liter = 1.000028 decimeter<sup>3</sup> = 1.000028 · 10<sup>-3</sup> meter<sup>3</sup>. Methods with a sensitivity lower than PDK are not presented in the book.

Along with sensitivity the extent of method selectivity is indicated, and if information is available the substances which interfere with determination are mentioned.

There are no specific, in the strict sense of the word, methods. Substances interfering with the determination of the sought compound may always be present in an industrial atmosphere. Their removal is usually accomplished

11/27

USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

in the course of the sample selection process by the use of selective absorption media.

It is necessary to emphasize the fact that the conditions of an industrial atmosphere as those of an analytical system are manifold and require a conscientious and skilled approach to analysis. Certain corrections which should be indicated by the knowledge of the technological process and the experience of the analyst may always be required.

Table of Contents	Page
Preface	9
Introduction	13
Sample Selection (General remarks)	16
HYDROCARBONS	
Determination of Benzene and White Spirit Vapors	24
Isobutylene	27
Crotonylene (dimethylacetylene)	29
Divinyl	30
Isoprene	32
Benzene	34

12/27

- 7 -

USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

Isopropylbenzene	36
meta-Diisopropylbenzene	37
Toluol	39
Ditolylmethane	40
Xylol	42
Dinile	44
Styrol	46
alpha-methylstyrol	47
Vinyltoluol	48
Divinylbenzene	49
Naphthalene	51
Tetralin	52
Turpentine	54
Cyclopentadiene	55
Dicyclopentadiene	57
Oil spray	58

13/27

USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

HALOGEN ORGANIC COMPOUNDS

Determination of Organochlorine Compounds (Group Method)	60
Bromo- and Iodoorganic Compounds	65
Halogen Organic Compounds when Forming Polymethyl Stains (group method)	68
Dichloroethane	70
Carbon tetrachloride	71
Methylene chloride	73
Phosgene	76
Glycerol mono- and dichlorohydrin	77
Allyl chloride	79
Vinyl chloride	80
Vinylidene Chloride	82
Chloroprene	84
Chlorobenzene	86
Benzyl chloride	87
Benzoyl chloride	88
Benzotrichloride	89
Monochlorostyrol	90

14/27

USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

Trichloronaphthalene	92
alpha-Monobromonaphthalene	93
Organochlorine insecticides	94
Cyanurin chloride	100
Simazin	101
Organophosphorus insecticides	103
Organophosphorus compounds (group method)	106
AMINE AND NITROGEN COMPOUNDS	
Determination of Aliphatic Amines	109
Primary aliphatic amines (group method)	111
Polyethylenepolyamines	112
High molecular amines	114
Alkylamine chlorohydrates	115
Secondary aliphatic amines	116
Dimethylamine	116
Diethylamine	118
Triethylamine	120
Dimethylnitrosamine	121

USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

Aliphatic amines in reaction with 2,4-dinitro- chlorobenzene (group method)	122
Hexamethylenediamine and Ethylenediamine	123
Aniline	124
Aromatic amines (aniline, meta- and parachloreniline, 3,4-dichloraniline)	126
para-Chloraniline	127
Dimethylaniline	128
Toluidine	129
Xylidine	130
Toluylenediamine	131
para-Aminoanisol	132
Dimethylbenzylamine	133
Mesidine	134
4,4'-Diaminodiphenylmethane	136
Nitroparaphines	137
Tetranitromethane	139

16/27

- 9 -

USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

Nitrobenzene	140
para-Nitrochlorobenzene	141
meta-Dinitrobenzene	143
Dinitrochlorobenzene	144
2,4-dinitrotoluol	145
Trinitrotoluol	147
Hexogen	148
Dinitrophenol	150
3,5-dinitro-o-cresol	151
para-Nitroanisol	152
Nitrocyclohexane	153
Isopropyl nitrate	154
Dicyclohexylamine nitrate	156

ORGANIC ACIDS AND THEIR DERIVATIVES

(anhydrides, amides, and nitrils)

Determination of Monobasic Fatty Acids (Group method)	158
Acetic Acids	159
Butyric Acids	160
Monochloroacetic Acids	162

17/27

USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

Thioglycollic Acids (mercaptoacetic)	163
Acrylic and metacrylic Acids	165
Chloropelargonic Acids	166
Monobasic perfluorinated Acids	167
Trifluoroacetic Acid	168
Aminopelargonic Acids	169
Aminoenanthic Acids	171
Maleic Anhydride	172
Phthalic Anhydride	173
Butyric Anhydride	174
Formamide	175
Dimethylformamide	176
Cyanamide	178
Dicyanodiamide	179
Caprolactam	180
Nitriles (Group Method)	182
Acrylonitrile	184

18/27

- 10 -



USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

Allycyanide	185
Dinitrile of Adipic Acid in the Presence of Ammonia	187
Benzyl Cyanide	188
Porofor 5 (para-Methylurethanbenzenesulfohydrazide)	190
Porofor 57 (Dinitrile of Azoisobutyric Acid)	191
ALCOHOLS AND PHENOLS	
Determination of Alcohols (Group Method)	194
Methyl Alcohol	195
Ethyl Alcohol	197
Higher Alcohols (Group Method)	199
Dimethylvinylcarbinol	201
Furfuryl Alcohol	202
Allyl Alcohol	203
Propargyl Alcohol	205
Ethyleneglycoline	206
Diethyleneglycol and Triethyleneglycol	208
Phenol	209
Resorcin	211
Dichlorocresol	212
Diphenyl Propane	213

19/27

USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

SIMPLE AND COMPLEX ETHERS

Determination of Diethyl Ether	215
Dioxane	216
Dimethyldioxane	218
Monochlorodimethyl Ether	220
beta, beta-Dichlorodiethyl Ether (Chlorex)	221
Vinylbutyl Ether	222
Complex Ethers (Group Method)	223
Methyl Ethers of Carboxylic Acids (Group Method)	225
Methyl Acetate	226
Methyl Acrylate	228
Butyl Acrylate	230
Methyl Glycol (Monomethyl Ether of Ethylene Glycol, Methylcellosolve)	231
Dimethyl Terephthalate	233
Diglycine Ether of Ethyleneglycol	235
Tricresyl Phosphate	236
Hexamethylene Diisocyanate	238

20/27

- 11 -

USSR

PEREGUD, Ye. A. and GERNET, Ye. V., Khimiya, 1970, pp 2, 3-8, 9-12, 13-15

Toluylene Diisocyanate	239
ALDEHYDES, KETONES, QUININES	
Determination of Carbonyl Compounds (Group Method)	242
Formaldehyde	243
Acetaldehyde	245
Crotonic Aldehyde	248
Acrolein	249
Acetone	252
Methylethylketone	254
Methylpropylketone and Methyhexylketone	255
Acetophenone	256
Furfural	257
Camphor	258
Cyclohexanone	260
Cyclohexanoneoxime	261
Mesityl Oxide	263
alpha-Naphthoquinone	264
2,3-dichloro-1,4-naphthoquinone	266
Chloranil (Tetrachloroquinone)	267

21/27